

ConneXium Ethernet Switches

499NMS25101

499NSS25101

499NMS25102

499NSS25102

Quick Reference Guide

Version 1.0

Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result** in death, serious injury, or equipment damage.



WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury, or equipment damage.



CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

PLEASE NOTE

Electrical equipment should be serviced only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material. This document is not intended as an instruction manual for untrained persons.

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Overview

Introduction

The four ConneXium Ethernet switches discussed in this guide are especially designed to connect single devices or complete network segments in industrial environments. They support Ethernet 10 MBit/s and fast Ethernet 100 MBit/s. The switch modules support switched Ethernet networks in accordance with IEEE standard 802.3 or 802.3u using copper and fiber optic technology. The switch modules are mounted on a standard DIN rail.

The four ConneXium Ethernet switches discussed in this guide are described in the following table:

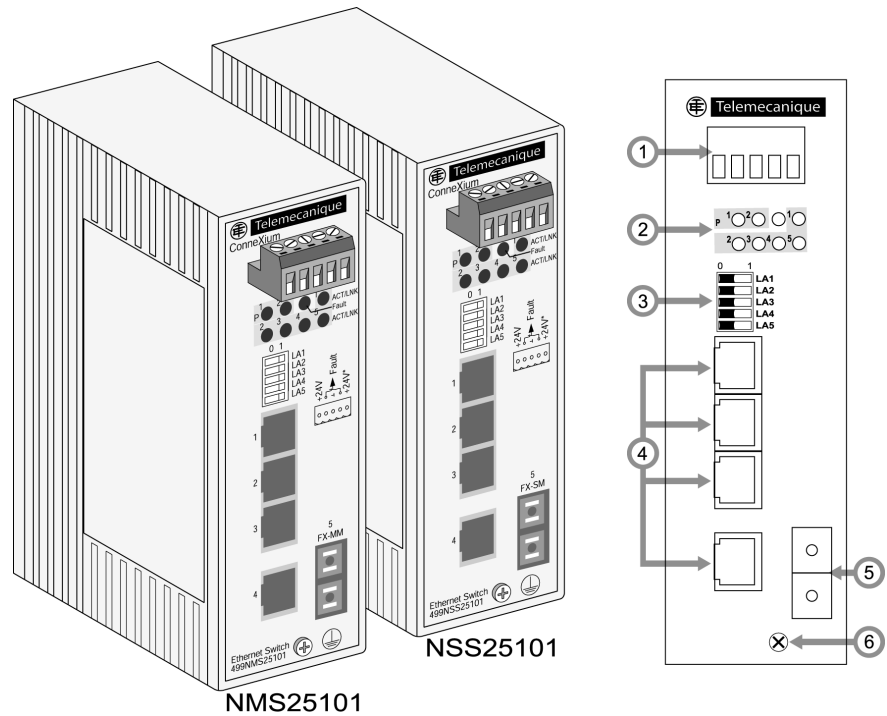
Ethernet Switch	Copper Ports	Fiber Optic Ports	Fiber Optic Type
499NMS25101	4	1	multi-mode
499NMS25102	3	2	multi-mode
499NSS25101	4	1	single-mode
499NSS25102	3	2	single-mode

Note: The multi- and single-mode capabilities of the modules are indicated by the designations *NMS* (multi-mode switch) and *NSS* (single-mode switch) in their respective part numbers.

The TP (copper) ports support half/full duplex and 10/100 Mbps autonegotiation, autopolarity, and autocrossing. The fiber optic ports support full duplex.

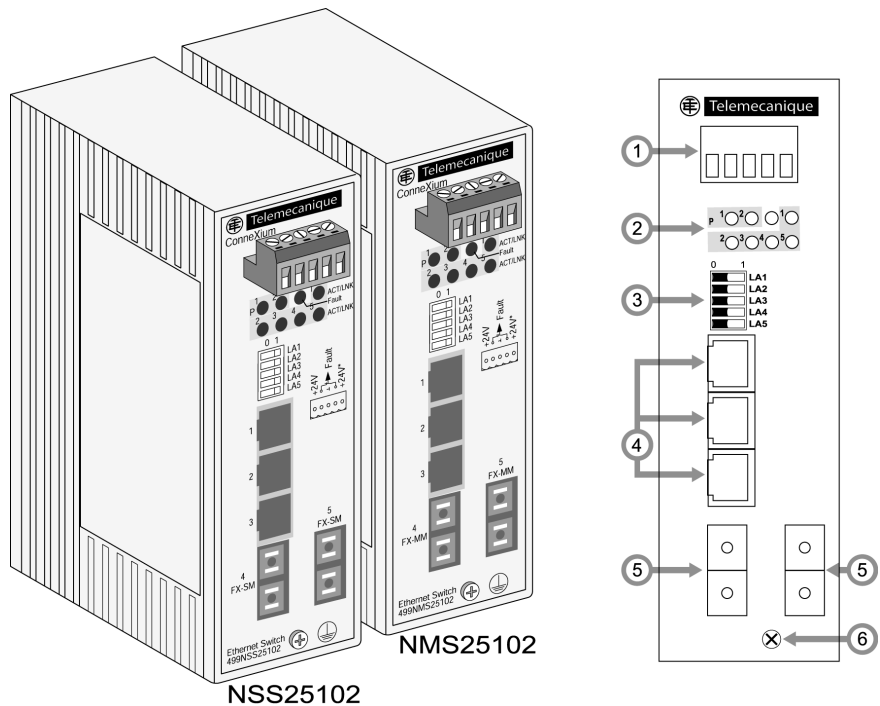
Description

The 499NMS25101 (fiber optic, multi-mode) and 499NSS25101 (fiber optic, single-mode) modules have four 10/100 MBit/s twisted pair ports (10/100 base-TX, RJ45 connectors) and one 100 MBit/s fiber optic port (100 base-FX, duplex SC connector). It is possible to connect up to four DTEs (data terminal equipment) or other TP/TX network segments to the TP/TX ports using twisted pair cabling. One further DTE or optical network component can be connected to the fiber port. The 499NMS25101 and 499NSS25101 modules appear as in the following figure:



- 1 5-pin power/alarm terminal block
- 2 LED display elements
- 3 5-pin DIP switch
- 4 10/100 base-TX (RJ45 connectors)
- 5 100 base-FX (SC fiber connector)
- 6 grounding screw

The 499NMS25102 (fiber optic, multi-mode) and 499NSS25102 (fiber optic, single-mode) modules have three 10/100 MBit/s twisted pair ports (10/100 base-TX, RJ45 connectors) and two 100 MBit/s fiber optic ports (100 base-FX, duplex SC connector). It is possible to connect up to three DTEs (data terminal equipment) or other TP/TX network segments to the TP/TX ports using twisted pair cabling. Two additional DTEs or optical network components can be connected to the fiber ports. The 499NMS25102 and 499NSS25102 modules appear as in the following figure:



- 1 5-pin power/alarm terminal block
- 2 LED display elements
- 3 5-pin DIP switch
- 4 10/100 base-TX (RJ45) connectors
- 5 100 base-FX (SC fiber) connectors
- 6 grounding screw

Features

Switching

Store and Forward

All data received by the ConneXium switches from all ports are stored and checked for validity. The switches discard the invalid and defective frames (frames greater than 1536 bytes or with CRC errors) and frame fragments (less than 64 bytes). The switches forward valid frames.

Multi-Address Capability

The switches learn source addresses on a per-port basis. Only packets with these addresses in the destination address field are sent to the ports:

- unknown addresses
- addresses learned at the specific port
- multicast and broadcast address

A switch can learn up to 1000 addresses. This becomes necessary if more than one terminal device is connected to one or more ports. Multi-address switching allows several independent subnetworks to be connected to a ConneXium switch.

The switches monitor the age of the learned addresses and delete entries from the address table that exceed a certain age (300 s).

Note: Restarting deletes the learned address entries.
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Tagging

Data packets with VLAN tags are transmitted unchanged by the switches (IEEE 802.1 Q).

TP/TX Interface

Link Control

The switches monitor the connected TP/TX line segments for short circuits and interrupts. They use regular link test pulses in accordance with IEEE standard 802.3 for 10/100 base-T. The switch modules do not transmit any data to a TP/TX segment from which they do not receive link test pulses.

Note: An unpopulated connection is assessed as a line interrupt. The TP/TX line to any terminal equipment that has been switched off is also assessed as a line interrupt since a de-energized bus coupler cannot transmit link test pulses.

Autopolarity Exchange

The switch automatically reverses polarity if the receive line pair is incorrectly connected (when RD+ and RD- are switched).

Autocrossing

The switch detects the transmit and receive pairs (MDI, MDI-X). It automatically configures its port for the correct transmit and receive pins. Consequently, it does not matter whether you connect devices using a crossover or straight cable.

F/O Interface

Link Control

The 499NMS2510x and 499NSS2510x modules monitor the connected F/O line for interrupts using idle signals during frame pauses (in accordance with IEEE standard 802.3 100 base-FX). These modules transmit data only to F/O lines from which they receive idle signal(s).

If the optical input power decreases below the low light threshold, the transmit and receive path is disabled for data and the idle signal is transmitted.

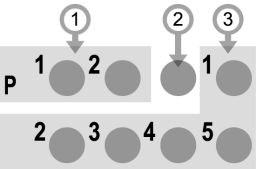
Far-End Fault

The optical transmission distance(s) of the 499NMS2510x and 499NSS2510x modules can be monitored in the receiving direction as well as in the transmitting direction if the other side also supports far-end fault. If both sides do not support far-end fault, the optical transmission distance is monitored only in receiving direction. The far-end fault is sent if the optical input power at the optical port has fallen under the low light level. If far-end fault is received, the link becomes inactive (the ACT/LNK LED is off).

Indicators

LEDs

Eight display elements indicate the module status (power, fault detection, and port status) of the ConneXium switches:



- 1 P1, P2 (power)
- 2 fault
- 3 ACT/LNK

The behavior of these LEDs is described in the following table:

Indicator	Color	State	Meaning
P1	green	on	power supply voltage 1 is present
		off	power supply voltage is less than 9.6V
P2	green	on	power supply voltage 2 is present
		off	power supply voltage is less than 9.6V
Fault (see note)	red	on	error indication
		off	no error indication
ACT/LNK 1...5	green	off	no valid link is on the port.
		steady	link is valid and data is not being received
		flashing	data is being sent or received
Note: See the alarm contact paragraph (below) for causes of fault indication.			

Alarm Contact

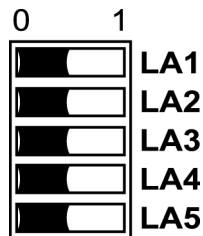
The alarm contact is used to supervise the functions of these Ethernet switches and thus facilitates remote diagnosis without management software. The alarm contact indicates one of these possible faults when activated:

- the failure of at least one of the two supply voltages
- a permanent fault in the switch (internal voltage supply)
- the faulty link status on at least one port. The indication of the link state on the switch can be masked on a port-by-port basis using DIP switches LA1...LA5.

Note: In case the voltage supply being routed without redundancy, the ConneXium switch modules indicate the failure of a supply voltage. You can prevent this message by feeding in the supply voltage through both inputs.

The Five-Pin DIP Switch (Port Status)

You can use the five-pin DIP switch on the front panel to suppress the faulty link status messages on a port-by-port basis.



Switch position **on** (factory default): The indication of the faulty link state is not suppressed. That is, the alarm contact indicates the invalid link.

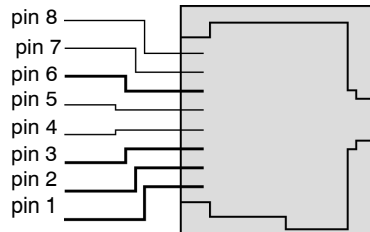
Wiring

Ethernet Wiring

The 10/100 Mbit ports (eight-pin RJ-45 sockets) on the ConneXium switches allow DTEs (or other independent network segments that comply with the standards IEEE 802.3 100 base-TX/10 base-T) to be connected. These ports support speed and duplex autonegotiation, autopolarity, and autocrossing.

The 10/100 Base-T(X) Connections

The socket casings are electrically connected to the front panel of the switch modules. The pin configuration complies with MDI-X:



pins 3 and 6 provide one line pair

pins 1 and 2 provide another line pair

remaining pins are not used

Ethernet Cables

Use Ethernet CAT5 or better grade cables, EIA568 pinout.

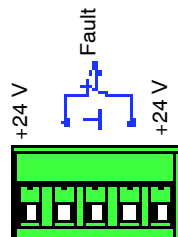
Fiber Wiring

The 100 MBit/s ports on these switches support the IEEE 802.3 100 base-FX FDX standard. They use duplex SC connectors. Each 100 MBit/s port allows the connection of an additional DTE or optical network component.


Power Wiring

Five-Pin Terminal Block

The supply voltage and the indicator contact are connected to the switch via a five-pin terminal block:



Voltage Supply

	WARNING
	<p>HAZARD OF ELECTRIC SHOCK OR BURN</p> <ul style="list-style-type: none"> • When the module is operated with direct plug-in power units, use only: <ul style="list-style-type: none"> — SELV supply units that comply with IEC 60950/EN 60950. — (in USA and Canada) Class 2 power units that comply with applicable National or Regional Electrical Codes. • Connect the ground wire to PE terminal before you establish any further connections. • When you remove connections, disconnect the ground wire last. <p>Failure to follow this precaution can result in death, serious injury, or equipment damage.</p>

Redundant voltage supplies are supported. Both inputs are de-coupled. There is no load distribution. The supply voltage is electrically isolated from the housing.

Class 1, Division 2 Wiring Notes

Note: Power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods [Article 501-4(b) of the National Electrical Code, NFPA 70] and the authority having jurisdiction.

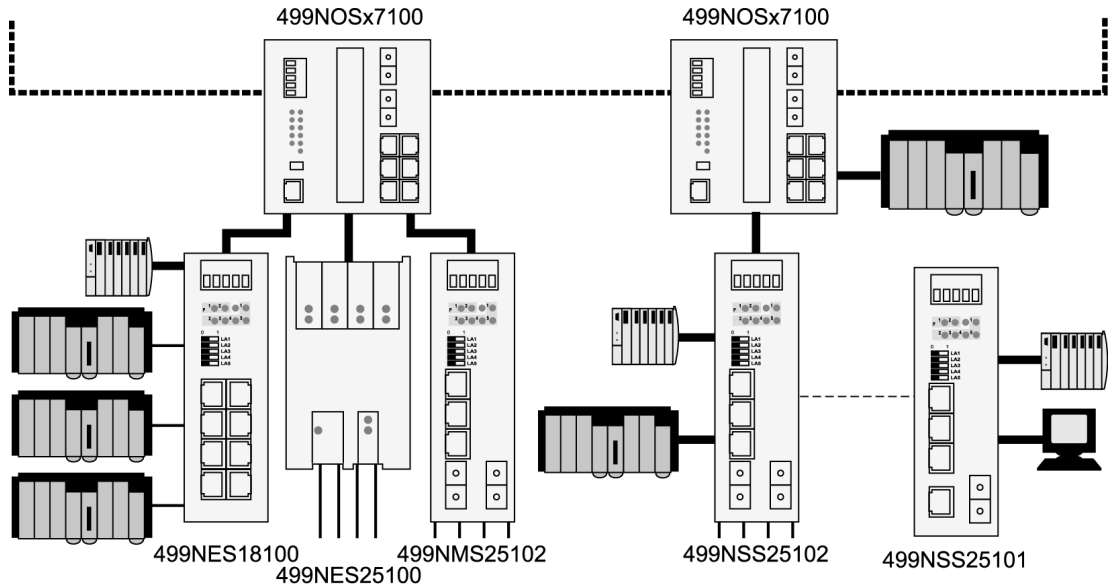
Note: Use 60/75 or 75°C copper (CU) wire only.

Note: Peripheral equipment must be suitable for the location in which it is used.




Application Example

Overview

The following figure shows the 499NSS25101, 499NMS25101, 499NSS25102, and 499NMS25102 switches in an industrial Ethernet environment:



Legend:

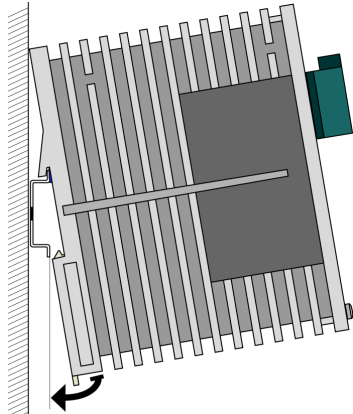
-----	100 Mbit/s HIPER-ring (fiber)		user workstation
=====	100 Mbit/s		PLC
-----	100 Mbit/s (single-mode fiber)		I/O block
—————	10 Mbit/s		

Installation

Installing

The equipment is delivered in ready-to-operate condition. The following procedure is appropriate for installation.

Note: The ConneXium switch is designed as open equipment per EN 61131-2. Install open equipment in industry-standard enclosures and restrict access to authorized personnel.

Step	Action
1	Check whether the DIP switch pre-settings suit your application.
2	Pull the five-pin terminal block off the switch module and wire up the supply voltage and indicator lines.
3	Fit the switch on a 35 mm standard DIN EN 50 022 rail: 
4	Attach the upper snap-on slide bar on the module to the DIN rail and press it down until it locks in position.
5	Connect the ground wire to PE terminal.
6	Install the Ethernet cables.
Note: Do not open the module housing.	
Note: The ventilation slits must not be covered, inhibiting free air circulation. The distance to the ventilation slots of the housing has to be a minimum of 10 cm.	
Note: This is a Class A device. This equipment may cause radio interference if it is used in a residential area. It is the operator’s responsibility to take appropriate preventative measures.	

**Ground
Connection**

The front panel of ConneXium switch modules is grounded via a separate ground connection. The grounding screw is located on the front panel of the 499NMS2510x and 499NSS2510x switches.
The Ethernet RJ-45 socket casings are electrically connected to the front panel of the switch.

Note: Make sure that the electrical installation meets local or nationally applicable safety regulations.

Dismantling

To take the ConneXium switch module off the ISO/DIN rail, insert a screwdriver horizontally under the housing into the locking slide, pull it downward (without tipping the screwdriver), and lift the module upward.

ConneXium Switch Specifications

General Data

Operating voltage		NEC Class 2 SELV 24 VDC (18 - 32 VDC)
		redundant inputs de-coupled
Hold up time		10 ms @ 24 VDC minimum
Power consumption @ 24 VDC	499NMS25101	5.4 W maximum
	499NSS25101	5.4 W maximum
	499NMS25102	5.9 W maximum
	499NSS25102	5.9 W maximum
Overload current protection at input		non-changeable fuse
Dimensions (W x H x D)		47 x 135 x 111 mm (1.9 x 5.3 x 4.4 in)
Weight	499NMS25101	330g (.728 lb)
	499NSS25101	330g (.728 lb)
	499NMS25102	335g (.739 lb)
	499NSS25102	335g (.739 lb)
Temperature	ambient	0...+60° C (32...140° F)
	storage	-25 ... +70° C (-13...+158° F)
Humidity		up to 95% (noncondensing)
Atmospheric pressure		79 kPa minimum
Laser protection		Class 1, conforming to EN 60825-1
Protection type		IP20
EMC	complies with requirements of EN61131-2 and EN55024.	
Mechanical/climatic	complies with requirements of EN61131-2	
Radiated emissions	complies with requirements of EN55022A/CISPR22A, EN55011A/CISPR11A and FCC15A.	
UL approval	UL508, UL1604, UL60950, CSA No. 14, CSA No. 213, CSA No. 60950	
Conforms to these Council Directives (for the European Economic Area market)	LV 23/73/EEC. Standards to which conformity is declared: EN60950, EN61131-2, EN60825-1	
	EMC 89/336/EEC. Standards to which conformity is declared: EN61131-2, EN55011, EN55022, EN55024	

Network Size

TP/TX port 10 base-T/ 100 base-TX	length of twisted pair segment		100 m (328 ft) max.
F/O port 100 base-FX (according to IEEE 802.3u 100 base-FX)	system attenuation	50/125 mm fiber (multi-mode)	0 to 8 db
		62.5/125 mm fiber (multi-mode)	0 to 11 db
		9/125 mm fiber (single-mode)	0 to 16 db (499NSS25101/ 499NSS25102)
	wave length	1300 nm (499NSS25101/499NSS25102)	
F/O line (example)	50/125 mm fiber (multi-mode)	5 km (3.11 mi) (approx.)	data of fiber: 1.0 dB/ km, 800 MHz*km
	62.5/125 mm fiber (multi-mode)	4 km (2.49 mi) (approx.)	data of fiber: 1.0 dB/ km, 500 MHz*km
	10/125 mm fiber (single-mode)	30 km (18.64) max. (499NSS25102)	data of fiber: 0.4 dB/km

Interfaces, Displays and Controls

Interfaces	499NMS25101	4 TP/TX ports	RJ45 sockets, 10/100 MBit/s
		1 FX port	duplex SC multi-mode connector, 100 MBit/s
	499NSS25101	4 TP/TX ports	RJ45 sockets, 10/100 MBit/s
		1 FX port	duplex SC single-mode connector, 100 MBit/s
	499NMS25102	3 TP/TX ports	RJ45 sockets, 10/100 MBit/s
		2 FX ports	duplex SC multi-mode connector, 100 MBit/s
	499NSS25102	3 TP/TX ports	RJ45 sockets, 10/100 MBit/s
		2 FX ports	duplex SC single-mode connector, 100 MBit/s
Displays	equipment status LEDs	1 green	P1 – power 1, supply voltage 1 present
		1 green	P2 – power 2, supply voltage 2 present
		1 red	Fault – indicator contact is open and indicates error
	port status LEDs	5 green	ACT/LNK 1...5 – activity/link status
Controls	five-pin DIP switch		LA1 ... LA5 – suppress messages about link status
Scope of delivery		ConneXium switch module	
		terminal block for supply voltage	
		installation and operating instructions	

Order number	499NMS25101
	499NMS25102
	499NSS25101
	499NSS25102

Accessories

Cable	Part	Available Lengths (m)
TF Ethernet SFTP CAT5 RJ45 cables	490NTW000••	2, 5, 12, 40, 80
TF Ethernet SFTP CAT5 RJ45 crossed cables	490NTC000••	2, 5, 12, 40, 80
Standard glass fiber optic adapter cable (1 sc connector, 1 MT-RJ connector)	499NOC00005	5
Where •• = length in meters with the selection of: 02, 05, 12, 40, 80		

Contact Information

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Company Address

Schneider Electric, One High Street, North Andover, MA 01845, USA



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